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THE DECLINE IN RAILWAY RATES; SOME OF ITS CAUSES AND RESULTS.

A PAMPHLET recently issued from the Division of Statistics of the Department of Agriculture contains the results of the first attempt to measure the decline in the rates of charge for railway services which, during the last two or three decades, has been a recognized characteristic of the development of facilities for land transportation in the United States, and to furnish students and the public generally with data for comparisons between that decline and contemporaneous changes in the prices of other services and of commodities. There had been numerous attempts in magazine articles and elsewhere to illustrate the tendency toward lower charges, and through the efforts of Mr. C. C. McCain, the former auditor of the Interstate Commerce Commission, a mass of exceedingly valuable data regarding changes in freight charges had been collected and published as part of the report on prices and wages, commonly known as the Aldrich report, prepared by the Committee on Finance of the United States Senate, but in none of these had there been any effort to present general averages which might be considered as fairly representative of all charges. The following explanation of the methods adopted for establishing the averages relating to freight traffic, published by the Department of Agriculture, is taken from its report, which states that similar methods were used in collecting the data relating to passenger service:

Data were collected and tabulated showing the number of miles of railway operated, the number of tons of freight carried, the number of tons of freight carried one mile, the number of miles run by freight trains, and the gross earnings from freight service for every railway relating to which all or any portion of the desired information could be obtained, and comparisons were made among the totals representing the aggregates of these items for each year after carefully excluding in each case every railway for which both the items from the aggregates of which the average was to be obtained had not

been secured. For example: it was ascertained that during 1882 several hundred railways performed services in the movement of freight which were equivalent to carrying 37,687,815,702 tons one mile, and it was also found that a still greater number of railways collected \$456,978,581 as compensation for the transportation of commodities. Obviously an accurate average rate per ton per mile could not be obtained by dividing the latter by the former amount. Such an operation would give an apparent rate of 1.213 cents, which is considerably higher than the actual rate, which was 1.102 cents, the latter result being obtained by deducting 9,821,525 ton miles for which the revenue could not be obtained, and \$41,852,320 of revenue from freight collected by railways for which the aggregate freight movement could not be ascertained.

It was also explained that all values originally stated in currency had been reduced to their equivalents in gold. The same practice has been followed in this paper with regard to all such amounts, whether from the report or not.

TABLE I.

AVERAGE RATES.

(Data from Bulletin No. 15, Division of Statistics, U. S. Department of Agriculture.)

Year	Average rate per mile per		Year	Average rate per mile per	
	Passenger	Ton of freight		Passenger	Ton of freight
1867.....	1.994	1.925	1882.....	2.391	1.102
1868.....	2.164	1.810	1883.....	2.402	1.205
1869.....	2.144	1.709	1884.....	2.323	1.136
1870.....	2.392	1.889	1885.....	2.216	1.011
1871.....	2.632	1.789	1886.....	2.142	.999
1872.....	2.521	1.846	1887.....	2.245	.984
1873.....	2.486	1.613	1888.....	2.108	.941
1874.....	2.544	1.520	1889.....	2.165	.922
1875.....	2.378	1.421	1890.....	2.167	.941
1876.....	2.183	1.217	1891.....	2.142	.895
1877.....	2.458	1.286	1892.....	2.126	.898
1878.....	2.573	1.296	1893.....	2.108	.878
1879.....	2.484	1.153	1894.....	1.986	.860
1880.....	2.442	1.232	1895.....	2.040	.839
1881.....	2.446	1.188	1896.....	2.019	.806

The above data, which have been taken from the report alluded to, show the average rates per passenger and per ton of freight per mile carried. It is scarcely necessary to observe that such averages, if accurate, constitute the most satisfactory

measure of railway charges, as they include local as well as through traffic, and in the case of freight traffic take into account all deviations from published schedules of charges, except such rebates as have been charged as operating expenses. The averages for the years 1889 to 1896, inclusive, were taken by the department from the report of the statistician to the Interstate Commerce Commission.

The following table shows the number of miles of railway operated in the United States during each year from 1867 to 1888, inclusive, and the percentage of such mileage represented by the averages under similar headings in the preceding table. The figures for the later years, obtained from the reports of the Interstate Commerce Commission, embrace practically the entire railway system of the country.

TABLE II.

PER CENT. OF RAILWAY MILEAGE INCLUDED UNDER SIMILAR HEADINGS IN TABLE I.

(Data from Bulletin No. 15, Division of Statistics, U. S. Department of Agriculture.)

Year	Miles of railway operated	Per cent. represented by average rate per mile per		Year	Miles of railway operated	Per cent. represented by average rate per mile per	
		Passenger	Ton of fr't			Passenger	Ton of fr't
1867....	36,940	21.34	23.12	1878....	79,958	69.32	68.42
1868....	39,408	33.07	36.11	1879....	84,965	63.65	64.07
1869....	43.510	42.01	47.66	1880....	89,753	71.63	72.12
1870....	49,168	47.17	48.93	1881....	97,859	75.10	75.76
1871....	55,829	45.29	44.61	1882....	108,974	75.27	75.41
1872....	63,268	44.16	48.27	1883....	118,006	87.75	87.78
1873....	68,485	60.33	56.59	1884....	123,568	86.56	86.57
1874....	71,068	60.54	55.58	1885....	126,275	80.66	80.93
1875....	72,675	62.71	59.43	1886....	132,635	79.00	79.23
1876....	75,250	65.19	61.62	1887....	144,676	75.35	75.73
1877....	77.530	66.77	60.10	1888....	149,902	81.02	81.39

The foregoing table is important, because it throws some light upon the propriety of regarding the data in Table I as fairly representative of the entire railway system of the United States. Table II shows that the data from which the averages in Table I were obtained related in each case to a sufficient mile-

age to justify the claim that the results secured are not merely fortuitous. One of the most satisfactory results of the Interstate Commerce law is the impetus it has given to a tendency which, prior to its enactment, was working slowly toward uniformity in methods of railway accounting. The existence of such a tendency is demonstrated by the progressively increasing proportion of the railway mileage of the country for which the information necessary for the work of the department could be collected. It would naturally be believed, and can be shown by evidence, that advances in the direction indicated, being toward more costly, though more perfect and useful methods of accounting, would be earliest made by the larger and more profitable railways, and it would be equally easy to demonstrate that without material exception such railways are those having greater density of traffic, more efficient service, and charging lower rates per unit of service. The corollary is sufficiently evident; in whatever degree the data in Table I do not fairly represent the entire railway system, they understate charges exacted during the earlier years, and make those of recent years appear relatively higher than they would could more accurate averages be obtained. This should be remembered in connection with whatever further reference to this table is made.

The average rate per passenger per mile for the year 1896 was apparently 1 per cent. higher than that charged during 1867, but it should be remembered that the latter was paid in currency and has been reduced to its equivalent in gold, which was at a premium of nearly 40 per cent., and relates to but one-fifth of the railway mileage in operation, while that of the later year includes practically the entire railway system. It is safe to assume, therefore, that were substantially complete data available, some reduction during the entire period covered by the table would appear. This assumption is supported by the fact that beginning with 1873, when for the first time the average represents as much as three-fifths of the operated mileage, a very material reduction is indicated. There may be some question, however, of the desirability of accepting changes in

the average rates per passenger per mile as, in themselves, to any considerable degree indicating the changes in the charges for railway services. This is not because earnings from passenger service constitute approximately but one-quarter of the total earnings from operation, nor because many competent railway managers believe that most passenger business is conducted at a loss, but because the service rendered to travelers has so materially changed as to render impossible of attainment that substantial similarity among the things compared which is essential to the successful application of the statistical method. To quote from the report :

The accommodations offered to the traveling public during the years prior to 1870 were greatly inferior to those provided at the present time, and the last three decades have been characterized by an improvement that has been continuous and progressive. The time required for passage between important cities is now but half, or less than half, that formerly consumed, and the safety of passengers has been correspondingly increased. Though it may appear that the decrease in the charges for the transportation of passengers has not been as great as that in the charges for freight service, it should be borne in mind that the thing which the traveler purchases with the money paid as fare has varied in his favor in every important element except that of distance. The dollar with which a man purchases transportation in a train moving at a modern rate of speed, provided with air brakes and automatic couplers, with coaches of modern construction, over a track composed of Bessemer steel rails weighing 100 pounds to the yard, on a line provided with block signaling apparatus, purchases vastly more than a dollar paid for transportation under the conditions which existed but one or two decades ago.

Turning to the average rate per ton of freight per mile we find that, though the data are subject to the same limitations which affect the corresponding average for passenger service, and though there has unquestionably been a material improvement in the character of the services rendered in the transportation of property, the table shows a continuous and quite regular reduction in the average charges for such services.

The relation of this decline to the reduction in the prices of agricultural products is shown in the following table for which the averages of the farm prices of each of the three commodi-

TABLE III.

DECLINE IN PRICES AND RATES.

(Data from Bulletin No. 15, Division of Statistics, U. S. Department of Agriculture.)

Year.	Percentages on basis of average, 1867 to 1872					Freight rates	
	Prices						
	Corn	Wheat	Oats	Mean	Wages ¹		
Av'rage 1867 to 1872	100	100	100	100	100	100	
1867.....	117	134	116	122	91	105	
1868.....	96	100	109	99	89	99	
1869.....	123	71	99	103	92	93	
1870.....	102	87	102	97	102	103	
1871.....	89	106	95	95	112	98	
1872.....	73	103	78	84	114	101	
1873.....	91	99	91	94	110	88	
1874.....	120	80	123	107	109	83	
1875.....	76	83	84	79	105	78	
1876.....	70	89	85	78	100	67	
1877.....	72	98	74	81	101	70	
1878.....	65	72	64	67	104	71	
1879.....	77	102	87	86	104	63	
1880.....	81	88	94	85	107	67	
1881.....	131	110	121	123	112	65	
1882.....	100	81	98	93	114	60	
1883.....	87	84	86	86	119	66	
1884.....	73	60	73	69	116	62	
1885.....	67	71	75	69	116	55	
1886.....	75	63	78	71	116	55	
1887.....	91	63	80	80	117	54	
1888.....	70	85	73	75	118	51	
1889.....	58	64	60	60	121	50	
1890.....	104	77	111	96	125	51	
1891.....	84	77	60	79	126	49	
1892.....	81	58	83	74	...	49	
1893.....	75	50	77	67	...	48	
1894.....	94	45	85	77	...	47	
1895.....	52	47	52	50	...	46	
1896.....	44	67	49	52	...	44	

¹ Based on data in Aldrich Report.

ties, corn, wheat, and oats, for the years 1867 to 1872, have been taken as bases upon which the percentages of the average prices of each year, 1867 to 1896 inclusive, have been calculated. The mean shown in column four was obtained by giving each item a weight roughly equivalent to its relative importance in the total value of the three products. The column headed "wages" contains similar percentages based upon the index

numbers representing general wages weighted according to the relative importance of the different industries included, which are contained in the Aldrich Report.

Briefly summarized, the foregoing data show that the decline in railway freight rates has exceeded that in the commodities, the prices of which are generally supposed to have most rapidly declined, and that it has been contemporaneous with a notable increase in wages. Those who seek to explain this decline are naturally led to examine the effect of competition upon railway charges and are met at the beginning of the investigation with the fact that there are two distinct forms of competition which affect the business of railway transportation, and with greater or less frequency control the rates obtainable for particular services. That which is most likely to attract a superficial observer on account of the similarity of its operations to those of the ordinary competition of trade, is among different routes which connect the same localities and seek the same traffic. Closer examination develops the facts, however, that such competition is active at relatively few points, affects but a small fraction of the aggregate traffic, and having as one of its direct results the enhancement of certain important operating expenses, actually tends to impose relatively excessive rates upon traffic not affected by this form of competition and thus indirectly to keep up the general average of all charges. The other form of competition affecting railway charges is that of different producers with whom railways and other carriers combine to compete for the privilege of supplying the same individual or locality with the same article. Whether New York, Chicago, Cincinnati, or some other city shall supply certain manufactured articles to large districts in the South is mainly a question of relative rates, and that the officials of the railways available for the transportation required have a lively appreciation of the extent in which their revenues are dependent upon the adjustment which can be maintained, is shown by the fact that it has been fixed by agreements among the lines carrying traffic from the different cities named. Most railway officials who have rate-making authority

are constantly seeking opportunities to open new markets for the commodities produced in the regions contiguous to their lines and are ready to make all reductions in rates which give promise of ultimately increasing gross earnings more than operating expenses. It is not proposed in this place to recapitulate the arguments by which it can be demonstrated that whatever general reduction has taken place in railway charges is due to the second form of competition, but merely to direct attention to the light thrown upon the subject by the data in Table I. Competition of the first kind, that of rival lines seeking the same traffic, has affected passenger business quite as much, perhaps even more, than it has freight business, but the second form of competition can but slightly, if at all, affect the rates charged for services in the transportation of persons. The rates operated on most vigorously by the first form of competition have declined but little, while the downward movement in those affected by both forms has been continuous and rapid.

While competition among producers seems to have been the primary cause of the remarkable reduction in railway freight rates, its effective operation would have been impossible had it not been accompanied by circumstances which have made it practicable to supply transportation at a lower cost. Among such circumstances that first to be mentioned is the substitution of Bessemer steel rails for those of iron, which has made possible the use of larger and more powerful locomotives and cars of increased weight and capacity. This change has been supplemented during recent years by the use of heavier rails, and the introduction of steel as a material for the framework of freight cars. The suggestion of the great decline in the price of steel rails in this connection is liable to be misconstrued. The cost of steel rails, when a part of original construction and usually when a part of the cost of betterments, is paid out of capital and thus becomes a source of fixed charges. No student will fail to understand, though the truth may not be popularly perceived, that fixed charges do not affect railway rates. The reduction in the price of steel rails by encouraging their substitution for iron

rails has added to the efficiency of railway facilities, and permitted economies in operation which have ultimately affected rates. The manufacture of steel rails in commercial quantities in the United States commenced during 1867, and in 1882 their price so nearly approached that of iron rails as to cause the manufacture of the latter to be discontinued. The following table shows the average price of steel rails at Pennsylvania mills during each year from 1867 to 1896 inclusive:

TABLE IV.
PRICES OF STEEL RAILS.

(Data from the Twentieth Statistical Abstract, Treasury Department.)

Year	Price per ton	Year	Price per ton	Year	Price per ton
1867	\$120.12	1877	\$43.42	1887	\$37.08
1868	113.46	1878	41.91	1888	29.83
1869	99.44	1879	48.25	1889	29.25
1870	92.91	1880	67.50	1890	31.75
1871	91.76	1881	61.13	1891	29.92
1872	99.64	1882	48.50	1892	30.00
1873	105.88	1883	37.75	1893	28.12
1874	84.76	1884	30.75	1894	24.00
1875	59.83	1885	28.50	1895	24.33
1876	53.14	1886	34.50	1896	28.00

The following table (p. 466) from Poor's *Manual of Railways* shows for each year from 1880 to 1896 the number of miles of track in the United States, the number of miles of track composed of steel rails, and the percentage of the latter to the total mileage.

The improvement in the efficiency of freight train service is shown by the fact that an increase in the number of tons carried per mile of line, itself both a cause and a result of declining rates, has not required an increase in the ratio of the number of miles run by freight trains to the number of miles of railway operated. The number of tons of freight carried one mile per mile run by freight trains, that is the average number of tons at one time in a train, which is a function of volume of traffic and train service, has increased more rapidly than traffic. Table

TABLE V.
USE OF STEEL RAILS.
(Data from Poor's *Manual of Railways* for 1897.)

Year	Miles of track	Track composed of steel rails	
		Miles	Per cent. of total
1880	115,647	33,680	29.1
1881	130,536	49,063	37.6
1882	140,960	66,691	47.3
1883	149,183	78,491	52.6
1884	156,497	90,243	57.7
1885	160,597	98,102	61.1
1886	168,048	105,724	62.9
1887	185,047	125,459	67.8
1888	191,497	138,516	72.3
1889	202,236	151,723	75.0
1890	208,303	167,606	80.5
1891	214,687	174,931	81.5
1892	221,499	182,858	82.6
1893	229,012	191,857	83.8
1894	232,919	197,653	84.9
1895	235,198	206,546	87.8
1896	235,483	207,619	88.2

VI (p. 467) shows this fact and also the number of tons carried regardless of distance per mile run by freight trains and the average length of haul per ton in miles. The value of the two latter items is in some degree impaired by the duplication incident to counting the same shipment as many times as the number of roads over which it passes. No statistics showing the average distance traversed by each shipment are available.

Among the men whose energies were directed to the development of railway facilities during the period immediately following the Civil War, the most intelligent and successful were quick to appreciate the advantages in methods and economy of operation which could be secured by consolidating into extensive and homogeneous systems the great number of small and independent lines then existing. No movement in the history of American railways is more significant or characteristic and none has had greater effect in permitting those economies in opera-

TABLE VI.
EFFICIENCY OF FREIGHT TRAIN SERVICE.

(Data from Bulletin No. 15, Division of Statistics, U. S. Department of Agriculture.)

Year	Number of tons carried one mile per mile of road operated	Number of miles run by freight trains per mile of road operated	Number of tons carried per mile run by freight trains	Number of tons carried one mile per mile run by freight trains	Average distance hauled in miles
1867.....	279,712	3,693	.867	80.77	101.23
1868.....	271,725	3,137	.858	82.99	95.88
1869.....	303,493	2,974	.987	92.88	106.02
1870.....	268,694	3,368	.856	81.72	97.67
1871.....	353,796	3,659	.921	91.19	100.87
1872.....	331,958	4,206	.877	84.92	95.68
1873.....	354,716	3,152	.932	93.44	103.89
1874.....	359,832	3,373	.974	89.01	97.08
1875.....	341,807	3,105	.954	99.58	105.88
1876.....	350,952	3,082	.980	110.24	107.22
1877.....	345,773	3,169	.983	111.14	109.02
1878.....	381,094	3,163	1.008	118.90	115.58
1879.....	450,700	3,507	1.151	128.57	111.73
1880.....	465,732	3,495	1.262	134.83	109.19
1881.....	479,618	3,525	1.210	134.92	111.10
1882.....	457,016	3,459	1.265	137.55	108.89
1883.....	411,921	3,243	1.137	127.24	111.29
1884.....	410,461	3,104	1.148	132.04	114.65
1885.....	442,629	3,218	1.183	140.07	117.54
1886.....	473,659	3,555	1.172	131.94	114.61
1887.....	513,513	3,206	1.312	155.11	116.20
1888.....	511,894	3,294	1.341	154.84	116.86
1889.....	448,069	2,574	1.41	179.35	127.36
1890.....	487,245	2,865	1.46	175.12	119.72
1891.....	502,705	2,871	1.51	181.67	120.00
1892.....	543,365	3,047	1.46	181.79	124.89
1893.....	551,232	3,056	1.46	183.97	125.60
1894.....	457,252	2,632	1.43	179.80	125.88
1895.....	479,490	2,622	1.55	189.69	122.32
1896.....	523,832	2,720	1.60	198.81	124.47

tion which have finally accrued to the general public in the form of reduced rates for railway services. The process of consolidation has proceeded along two fairly distinct lines. The first chronologically is the formation of such lines as those operated by the New York Central and Hudson River Railroad, the Pennsylvania Companies, and many others, by the union of short connecting lines. The main line of the former road was constructed, and for a time operated, by eleven companies, ten of which, forming the line from Albany to New York, were consol-

idated as the New York Central Railroad in 1853, the line from New York to Albany, which had been independently operated for eighteen years, being added in 1869. The addition of the New York and Harlem Railroad to the properties operated by the same companies in 1873 is an illustration of the second phase of consolidation, that of parallel lines. Much of the latter has taken the form of leases, the lessor companies sometimes continuing their operating organizations. In other cases the practical merging of parallel lines in a single organization has been accomplished by the purchase of controlling interests by the same individual or group of individuals, and does not find expression in the form of their corporate organizations. The following table (p. 469) shows the progress of unification as far as it can be traced statistically, but does not include those practical consolidations which have not affected the operating organizations. The data for 1892 and 1896 are from the reports of the statistician to the Interstate Commerce Commission, and are substantially complete. Those for 1867 represent 46.61 per cent.; for 1872, 68.40 per cent.; for 1877, 87.32 per cent.; for 1882, 89.44 per cent., and for 1887, 87.81 per cent. of the entire railway mileage in operation. It is probable that the inclusion of all roads, had it been practicable, would have increased the proportions in the classes embracing the shorter lines. In other words, the table does not show the full relative increase of mileage operated by the more important corporations.

The increased use of railway facilities about to be shown occupies a dual position with reference to railway rates. The elasticity of railway traffic is too frequently overestimated and there are unquestionably many commodities, the total movement of which is very nearly independent of the rates charged, yet reductions in rates do increase traffic and it seems fairly certain that the extensive use now made of railways would have been impossible had rates remained as high as they were thirty, twenty, or even ten years ago. The principal way in which reductions in rates secure this result is by increasing the radii of the regions within which the products of particular localities can

TABLE VII.
UNIFICATION OF THE RAILWAY SYSTEM.

Items	Mileage over 1000	Mileage from 600 to 1000	Mileage from 400 to 600	Mileage from 250 to 400	Mileage under 250	Total
1867						
Number of roads.....	1	3	7	11	72	94
Aggregate mileage in class...	1,152	2,252	3,440	3,189	7,183	17,216
Per cent. of total mileage.	6.69	13.08	19.98	18.52	41.73	100.00
1872						
Number of roads.....	6	12	7	21	226	272
Aggregate mileage in class...	6,910	9,050	3,523	6,331	17,460	43,274
Per cent. of total mileage.	15.97	20.91	8.14	14.63	40.35	100.00
1877						
Number of roads.....	11	12	17	34	362	436
Aggregate mileage in class...	13,648	8,807	8,154	10,700	26,388	67,697
Per cent. of total mileage.	20.16	13.01	12.04	15.81	38.98	100.00
1882						
Number of roads.....	19	14	20	48	400	501
Aggregate mileage in class...	35,950	11,179	9,807	15,720	24,814	97,470
Per cent. of total mileage.	36.88	11.47	10.06	16.13	25.46	100.00
1887						
Number of roads.....	28	19	27	53	434	561
Aggregate mileage in class...	55,447	14,671	13,860	16,694	26,373	127,045
Per cent. of total mileage.	43.64	11.55	10.91	13.14	20.76	100.00
1892						
Number of roads.....	43	24	24	40	871	1,002
Aggregate mileage in class...	99,232	18,052	12,307	12,796	29,115	171,502
Per cent. of total mileage.	57.86	10.53	7.17	7.46	16.98	100.00
1896						
Number of roads.....	44	22	24	44	977	1,111
Aggregate mileage in class...	103,346	17,450	12,158	14,226	34,498	181,678
Per cent. of total mileage.	56.89	9.60	6.69	7.83	18.99	100.00

be profitably marketed. The development of industries, the increasing specialization of productive functions and the consequent territorial division of labor, have tended to increase the relative importance of transportation as a factor in production and this would, even without the great reduction in railway rates, have thrown an increasing traffic to the railways. The extent in which this increase has taken place is shown by Table VIII, page 470.

The figures in the following table are based upon the estimates of population for the years intermediate to census years, made by the government actuary of the Treasury Department

TABLE VIII.
USE OF RAILWAY FACILITIES.

Year	Number carried one mile per capita of population		Year	Number carried one mile per capita of population		Year	Number carried one mile per capita of population	
	Passen- gers	Tons of freight		Passen- gers	Tons of freight		Passen- gers	Tons of freight
1867....	138	285	1877....	118	578	1887....	208	1,266
1868....	121	290	1878....	117	640	1888....	168	1,018
1869....	115	350	1879....	124	784	1889....	189	1,121
1870....	138	343	1880....	141	833	1890....	189	1,217
1871....	149	499	1881....	158	915	1891....	201	1,267
1872....	161	517	1882....	179	949	1892....	204	1,349
1873....	140	583	1883....	176	905	1893....	213	1,400
1874....	142	598	1884....	183	924	1894....	209	1,177
1875....	136	565	1885....	178	995	1895....	175	1,222
1876....	144	585	1886....	189	1,094	1896....	183	1,338

and upon the railway mileage and density of traffic reported in Bulletin No. 15 of the Division of Statistics of the Department of Agriculture. They are, therefore, subject to an allowance for the error arising from the exclusion from the data from which averages for the earlier years were obtained of some roads having less than the average amount of traffic per mile. The average rate per ton per mile charged for moving either passengers or freight naturally decreases as the distance carried increases on account, at least principally, of the fact that terminal expenses do not vary with distance. A great increase in the average distance traversed by each passenger or shipment of freight might result in a decrease in average charges which would not represent any reduction in the charges exacted for identical services, in other words a change in the averages so effected would not indicate any real change in railway rates. The lower average sums collected from each passenger and for each shipment must, however, be regarded as a result rather than a cause of the decline in the average rate, for they have not been accompanied by any change in the average distances traversed which would be adequate to produce the changes in the averages which have been noted.

The average distance traveled by passengers has changed but little since 1867, the slight reduction being attributable, probably, to the increase in suburban traffic. The increased average distance traversed by freight shipments may possibly be explained by the development of the agricultural lands of the Mississippi valley and the utilization of the food products of the cattle ranges of the great West.

The average sums collected from each passenger and for each ton of freight shipped are shown below:

TABLE IX.

AMOUNTS PAID PER PASSENGER AND PER SHIPMENT.

(Data from Bulletin No. 15, Division of Statistics, U. S. Department of Agriculture.)

Year	Amount collected per		Year	Amount collected per	
	Passenger	Ton of weight		Passenger	Ton of freight
1867.....	\$0.71.123	\$1.69.245	1882.....	\$0.64.716	\$1.16.808
1868.....	.60.747	1.58.128	1883.....	.65.372	1.34.127
1869.....	.65.886	1.53.763	1884.....	.61.216	1.30.070
1870.....	.79.559	1.66.955	1885.....	.55.969	1.19.398
1871.....	.74.743	1.65.792	1886.....	.53.674	1.13.879
1872.....	.69.873	1.60.980	1887.....	.56.463	1.15.953
1873.....	.67.342	1.57.026	1888.....	.53.822	1.08.683
1874.....	.67.495	1.44.341	1889.....	.52.986	1.17.394
1875.....	.63.831	1.47.556	1890.....	.51.535	1.09.690
1876.....	.63.631	1.40.908	1891.....	.52.067	1.08.664
1877.....	.65.751	1.50.728	1892.....	.51.205	1.13.291
1878.....	.67.807	1.51.637	1893.....	.51.085	1.11.534
1879.....	.63.336	1.28.709	1894.....	.52.851	1.10.252
1880.....	.61.870	1.35.830	1895.....	.49.486	1.05.846
1881.....	.65.800	1.32.954	1896.....	.52.078	1.03.378

The business of supplying railway transportation is subject to the law of increasing returns and an addition to traffic secured without reducing rates will usually produce an increment of gross earnings which is relatively greater than the increase in operating expenses; thus producing an increase in the proportion to gross earnings of the net income available for interest on funded debt, dividends on stock, or betterments. It is popularly supposed and is, within certain well defined limits, true that the operation of this law together with the elasticity of some classes

of traffic will permit the reduction of rates on such traffic without producing a consequent reduction in net income. Unfortunately, at least from the standpoint of investors in railway securities, the decline in rates has gone beyond the point at which it could have been fully compensated by the economies consequent upon increased traffic. The figure which expresses the relation of operating expenses to gross earnings is one of the most important of those secured by railway accountants and shows conclusively that even the severe economies of recent years have not prevented a relative increase in the cost of operations. Table X shows this relation for all of the railways of the United States :

TABLE X.

RELATION OF OPERATING EXPENSES TO GROSS EARNINGS.

(Data from Twentieth Statistical Abstract of the Treasury Department and reports of the statistician to the Interstate Commerce Commission.)

Year	Per cent.	Year	Per cent.	Year	Per cent.
1873.....	65.08	1881.....	61.18	1889.....	66.81
1874.....	63.58	1882.....	63.62	1890.....	65.80
1875.....	63.12	1883.....	63.82	1891.....	66.73
1876.....	62.50	1884.....	65.21	1892.....	66.67
1877.....	63.85	1885.....	65.12	1893.....	67.82
1878.....	61.73	1886.....	63.84	1894.....	68.14
1879.....	58.80	1887.....	64.45	1895.....	67.48
1880.....	58.36	1888.....	65.34	1896.....	67.20

The decline in rates has so far exceeded the increase in the volume of traffic as to produce an actual reduction in the average earnings per mile of line, while the still greater decline in net earnings, due to the fact that it was impossible to inaugurate economies in operation adequate to offset the reduction in gross earnings, has resulted in leaving a constantly decreasing balance available for the payment of interest on bonds and dividends on stock. The table page 473 shows these items in detail. The slight excess of interest and dividends over net earnings per mile of line during the last three years is probably due to payments on account of capital having been made from

accumulated surplus or the product of new loans. The increase in the amount of interest payments per mile of line is attributable to the fact that funded debt now constitutes a slightly larger proportion of the total capitalization than formerly. The increase is from 43.25 per cent. in 1873 to 50.54 per cent. in 1896.

TABLE XI.
EARNINGS, INTEREST, AND DIVIDENDS.

(Prepared from data in Twentieth Statistical Abstract, Treasury Department.)

Year	Average per mile of line				
	Gross earnings	Net earnings	Interest on funded debt	Dividends on stock	Total interest and dividends
1871.....	\$8,086	\$2,842	.....	\$1,132	.....
1872.....	7,221	2,573	.....	1,000	.....
1873.....	6,929	2,419	.....	883	.....
1874.....	6,781	2,470	.....	873	.....
1875.....	6,155	2,270	.....	909	.....
1876.....	5,981	2,242	.....	818	.....
1877.....	6,003	2,170	\$1,174	743	\$1,917
1878.....	6,121	2,344	1,259	670	1,929
1879.....	6,646	2,738	1,329	780	2,109
1880.....	7,471	3,111	1,171	939	2,110
1881.....	7,548	2,930	1,242	1,004	2,246
1882.....	7,283	2,649	1,336	967	2,303
1883.....	7,495	2,679	1,425	921	2,346
1884.....	6,663	2,317	1,412	806	2,218
1885.....	6,208	2,162	1,457	617	2,074
1886.....	6,570	2,376	1,403	640	2,043
1887.....	6,799	2,417	1,365	657	2,022
1888.....	6,541	2,046	1,331	543	1,874
1889.....	6,455	2,069	1,356	517	1,873
1890.....	6,829	2,163	1,374	529	1,903
1891.....	6,852	2,136	1,362	542	1,904
1892.....	6,852	2,068	1,377	550	1,927
1893.....	6,903	2,069	1,396	544	1,940
1894.....	6,055	1,803	1,360	474	1,834
1895.....	6,097	1,804	1,380	454	1,834
1896.....	6,223	1,837	1,402	450	1,852

The aggregate sum paid as dividends on stock during 1896 was actually nearly 20 per cent. less than that paid during the year 1882. The census of 1880 reported that railway stock having a par value of \$510,538,018, or 19.53 per cent. of the amount then outstanding, received no dividends during that

year. In 1889 the statistician to the Interstate Commerce Commission found that the percentage of non-dividend paying stock had risen to 61.67 of the total, while in 1896 the par value of similarly portionless stock was \$3,667,503,194, or 70.17 per cent. of the aggregate. In the latter year bonds representing an indebtedness aggregating \$515,029,668, being 11.40 per cent. of the amount outstanding received no interest. It is not surprising to find that many of the corporate units composing the railway system have not been able, during a period characterized by such changes as have been noted, to attain a degree of financial stability which would protect them from disaster during periods of monetary stringency and commercial depression.

TABLE XII.
RAILWAY RECEIVERSHIPS AND FORECLOSURES.
(Data from *The Railway Age* of December 31, 1897.)

Year	Receiverships		Foreclosures	
	Miles	Capital	Miles	Capital
1876.....	6,662	\$467,000,000 ¹	3,840	\$217,848,000 ¹
1877.....	3,637	220,294,000 ¹	3,875	198,984,000 ¹
1878.....	2,320	92,385,000 ¹	3,906	311,631,000 ¹
1879.....	1,102	39,367,000	4,909	243,288,000
1880.....	885	140,265,000	3,775	203,882,000
1881.....	110	3,742,000	2,617	127,923,000
1882.....	912	39,074,000	867	65,426,000
1883.....	1,990	108,470,000	1,354	47,100,000
1884.....	11,038	714,755,000	710	23,504,000
1885.....	8,386	385,460,000	3,156	278,494,000
1886.....	1,799	70,346,000	7,687	374,109,000
1887.....	1,046	90,318,000	5,478	328,181,000
1888.....	3,270	186,814,000	1,596	64,555,000
1889.....	3,803	99,664,000	2,930	137,815,000
1890.....	2,963	105,007,000	3,825	182,495,000
1891.....	2,159	84,479,000	3,223	168,069,000
1892.....	10,508	257,692,000	1,922	95,898,000
1893.....	29,340	1,781,046,000	1,613	79,924,000
1894.....	7,025	395,791,000	5,643	318,999,000
1895.....	4,089	369,075,000	12,831	761,791,000
1896.....	5,441	275,597,000	13,730	1,150,377,000
1897.....	1,537	92,909,000	6,675	517,680,000

¹ Amounts unaffected by fluctuations in gold value of currency, consequently not reduced.

The tale of railway bankruptcies is a long one and includes many companies owning lines the traffic of which should return a fair profit. The above table shows the number of miles of railway operated by, and the total capitalization of the corporations, respectively, placed in the hands of receivers and sold in foreclosure proceedings during each year from 1876 to 1897 inclusive.

According to the statistician to the Interstate Commerce Commission, the United States Courts were, on June 30, 1894, operating 40,818.81 miles of railway through receivers, and two years later this mileage had been reduced, by foreclosures and reorganizations but 25 per cent. It is not intended in this paper, to comment upon the facts shown, or to question the desirability of the reductions in rates which have taken place. It will not be amiss, however, to suggest that unless the latter is doubtful, it will be advantageous to consider whether railway corporations should not be placed in a position to attain more satisfactory financial results from their operations, particularly as all experienced railway officials and all intelligent students of transportation agree, that in the absence of statutory restraint important economies in operation would be possible.

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